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MOR.034

AMENDMENTS TO THE SPECIFICATION

Paragraph 0034 is amended as follows:

[0034] Referring to Figure 1, an embodiment of ring oscillator is generally designated by the reference numeral 10. The ring oscillator 10, which is operable responsive to the first and second control signals, includes a feedback input terminal 12, a circuit output terminal 14 for generating an oscillator output signal, and a positive feedback loop 16 between the circuit output terminal 14 and the feedback input terminal 12. The positive feedback loop 16 includes a plurality of delaying inverting stages 18, in an odd number, connected in cascade. A transfer gate 20 is coupled to the input of each of the delaying inverting stages 18. Each transfer gate 20 includes a pair of complementary transistors of the first and second conductivity types connected in parallel. In the embodiment, a p-channel MOSFET 22 and an n-channel MOSFET 24 are connected in parallel to form the pair of complementary transistors of each transfer gate 20. The transistors of the first conductivity type, in the form of p-channel MOSFETs 22, are directly controlled by the first control signal. The transistors of the second conductivity type, in the form of n-channel MOSFETs 24, are directly controlled by the second control signal. A control circuit 26 shifts the first and second control signals so that the MOSFETs 22 of the transfer gates ~~18~~ 20 are directly controlled by the first control signal and the MOSFETs 24 of the transfer gates ~~18~~ 20 are directly controlled by the second control signal to establish any desired one test mode out of the first, second, and third modes.

Paragraph 0051 is amended as follows:

[0051] As mentioned before, the p-channel and n-channel constituting the IC are identical in structure to the p-channel and n-channel MOSFETs 22 and 24 of ~~he~~ the ring oscillator 10. Thus, the periods Tp, Tn, and Tt of the ring oscillator 10 correspond to a period reflecting the p-channel MOSFETs of the IC, a period reflecting the n-channel MOSFETs of the IC, and a period reflecting the total of the p-channel and n-channel MOSFETs of the IC, respectively.

Paragraph 0056 is amended as follows:

[0056] In the Table 60, "SLOW", "TYP", "FAST", "PLNH", and "PHNL" are five different combinations (MODELS) of delay characteristics of p-channel and n-channel MOSFETs constituting the ring oscillator 50. Under the model "SLOW", both p-channel and n-channel MOSFETs have high thresholds so that their transmission delays are long. Under the model ~~"TYPE",~~ "TYP", both p-channel and n-channel MOSFETs have optimum thresholds so that their transmission delays are optimal. Under the model "FAST", both p-channel and n-channel MOSFETs have low thresholds so that their transmission delays are short. Under the model "PLNH", the p-channel MOSFET has a low threshold, but the n-channel MOSFET has a high threshold. Under the model "PHNL", the p-channel MOSFET has a high threshold, but the n-channel MOSFET has a low threshold.

Paragraph 0060 is amended as follows:

[0060] The present invention may be further understood by referring now to Figure 4A,

illustrating ~~I~~in flow chart form, a portion of a test method 62 in accordance with an embodiment of the present invention. In step 64, a ring oscillator 10 or 50 (see Figures 1 and 2) is provided on each die of a wafer being fabricated. The p-channel and n-channel MOSFETs constituting each ring oscillator are fabricated with p-channel and n-channel MOSFETs constituting integrated circuit(s) on the wafer. In step 66, testing of the wafer begins with a first die. In step 68, first, second, and third periods of the ring oscillator on the current die are measured by operating the ring oscillator to provide a first oscillator output signal during the first mode, by operating the ring oscillator to provide a second oscillator output signal during the second mode, and by operating the ring oscillator to provide a third oscillator output signal during the third mode, respectively. In step 70, the ring oscillator measurements are logged to a database. The die may be identified and logged based on the position on the wafer. The position may be specified in terms of an artesian (x, y) coordinate system defined by the wafer.

Paragraph 0062 is amended as follows:

[0062] Referring now to Figure 4B, illustrating, in flow chart form, analysis step 76, in further detail. In step 78, the analysis begins with the first die logged. In step 80, it is determined if the measured third period falls within a selected specification. For example, in step 80 it may be determined if the third period of the ring oscillator is less than a selected limit of 80 nsec. If, in step 80, the third period of the ring oscillator on the die under test is outside of the selected specification, then the coordinates of the die are logged to the database

in step 82, or otherwise recorded. If however, the third period of the ring oscillator on the die under test is within the selected specification, in step 84 it is determined if the measured first period falls within a selected specification. For example, in step 84 it may be determined if the first period of the ring oscillator on the die under test is less than a selected limit of 120 nsec. If, in step 84, the first period of the ring oscillator on the die under test is outside of the selected specification thereof, then the coordinates of the die are logged to the database in step 82, or otherwise recorded. If however, the first period of the ring oscillator on the die under test is within the selected specification thereof, in step 86 it is determined if the measured second period of the ring oscillator on the die under test falls within a selected specification. For example, in step 86 it may be determined if the second period of the ring oscillator on the die under test is less than a selected limit of 120 nsec. If, in step 86, the second period of the ring oscillator on the die under test is outside of the selected specification thereof, then the coordinates of the die are logged to the database in step 82, or otherwise recorded. If however, the second period of the ring oscillator on the die under test is within the selected specification thereof, in step 88 it is determined if the current die is the last die logged to the database. If not the methodology proceeds to the ~~nest~~ next die in step 90, and then loops over the remaining dice logged into the database in step 70, in Figure 4B. If however, in step 88 all the logged dice have been screened, in step 92 a map of the defective region on the corresponding wafer is output. This map may be generated from the x-y coordinates of the dice logged in step 82. Those dice that are out of specification, and which would reduce performance may be culled without sacrificing the entire wafer.

Paragraph 0064 is amended as follows:

[0064] Preferred implementations of the present invention include implementations as a computer system programmed to execute the method described herein, and as a computer program product. According to the computer system implementation, sets of instructions for executing the method are resident in the random access memory 414 of one or more computer systems configured generally as described above. Until required by the computer system, the set of instructions may be stored as a computer program product in another computer memory, for example, in disk drive 420. The disk drive 420 may include a removable memory such as ~~n~~ an optical disk or floppy disk for eventual use in the disk drive 420. Further, the computer program product can also be stored at another computer and transmitted when desired to the user's work station by a network or by an external network such as the Internet. One skilled in the art would appreciate that the physical storage of the sets of instructions physically changes the medium upon which it is stored so that the medium carries computer readable information. The change may ~~le~~ be electrical, magnetic, chemical, biological, or some other physical change. While it is convenient to describe the embodiment of the present invention in terms of instructions, or the like, the reader should remember that all of these and similar terms should be associated with the appropriate physical elements.